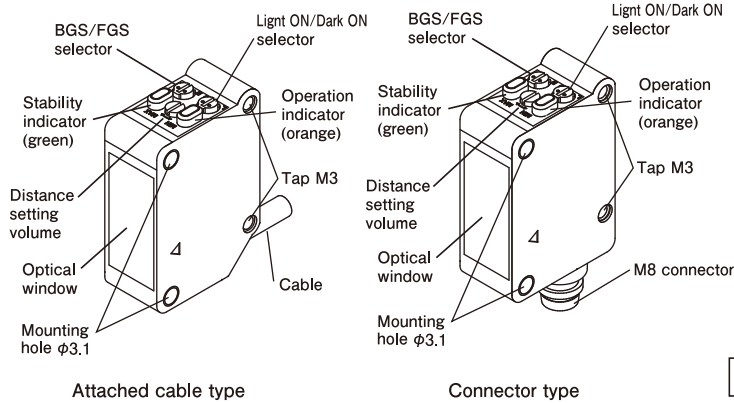


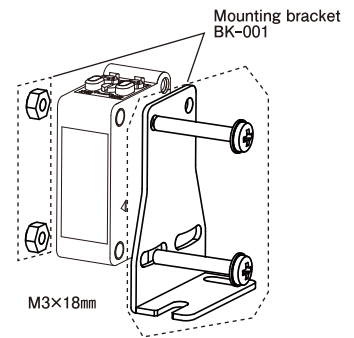
## DLN SERIES Instruction Manual (Middle range)

### 1 PARTS DESCRIPTION



### 4 MOUNTING

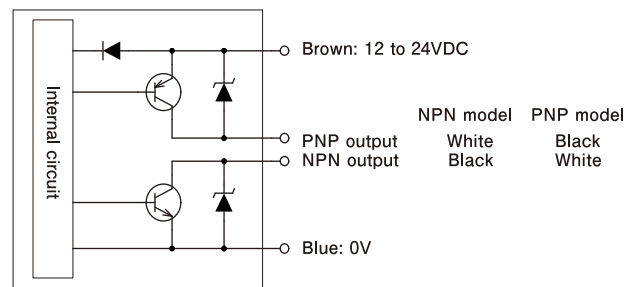
BK-001 mounting bracket is separately available. Use M3 screws as below with a tightening torque of 0.5N·m or less.



### 5 CONNECTION

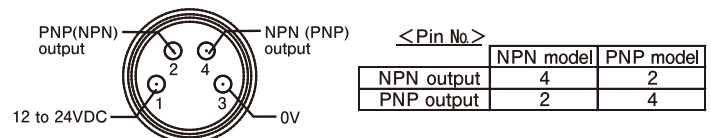
PNP model is available for which PNP output is allocated to black wire/pin No.4.

Model number followed by "P" are for PNP models. Ex. DLN-S3RMVP or DLN-S3RMVP-J



Do not use the NPN and the PNP outputs simultaneously. Insulate unused output cable.

(Pin allocation for M8 connector NPN model)



### 2 SAFETY PRECAUTIONS

To ensure safety, be sure to follow the precautions below.

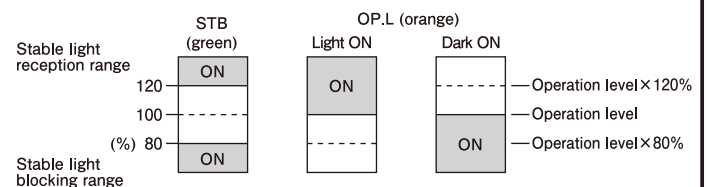
- Do not use this product for life or safety critical applications.
- Do not use this product when its housing or cable is damaged.
- Do not attempt to disassemble, repair, or modify this product.
- Do not use this product in an environment containing flammable, explosive or corrosive gas.
- Do not use this product in an environment exposed to chemicals or oils.
- Do not use this product in an environment exposed to water including outdoors or under the water.
- Use this product within the product rating and specification.
- Do not expose this product to direct sunlight.
- Do not use this product in an environment exposed to vibration or shock.
- Clean the optical window using a soft cloth. Do not use organic solvent such as alcohol and thinner.
- Perform a daily operation check, weekly periodical inspections, and prescribed maintenance procedures to ensure correct operation.
- This product should be disposed of as an industrial waste.

### 3 PRECAUTIONS DURING USE

- Be sure to route the sensor cables separate from any power transmission or high voltage line, or else use shielded cables. Using the same conduit or duct as high voltage or power lines will cause malfunctions or damage because of electromagnetic induction.
- Do not apply excessive force to the cable.
- When using a switching regulator, be sure to ground the frame ground (FG) terminal.
- Turn off the power of the load first as this product may generate an output pulse when the power is turned off.
- Avoid turning the power on and off consecutively.
- When extending the cables, use conductors of 0.3 mm<sup>2</sup> cross-sectional area or more and check the voltage drop.
- Limit the current of the power supply to 2A.
- A malfunction may occur if foreign light including sunlight, inverter or LED light enters directly into the optical window of the sensor.
- A glossy or mirror-like structure behind the detecting object may cause faulty operation. It may be fixed by mounting the sensor at an angle to the structure.

### 6 INDICATORS

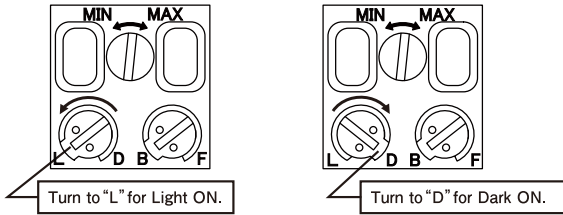
- The operation indicator (orange LED) and stability indicator (green LED) show the levels of received light intensity as described in the figure.
- After distance setting, use a detection object to block and unblock the light beam several times to make sure that the both activation and deactivation are occurred within the stable light reception range and the stable light blocking range.
- This setting achieves higher reliability against changes in the operating environment generated after installation.
- The orange LED (OP.L) is the operation indicator. In the Light ON mode, it turns on when the sensor receives light. In the Dark ON mode, it turns on when the sensor receives no light.



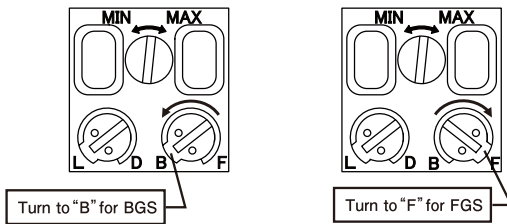
## 7 SETTING

Do not stop the selector in-between the two end stops. Do not apply excessive force to turn the selector over the end stop.

### (1) Light ON/Dark ON

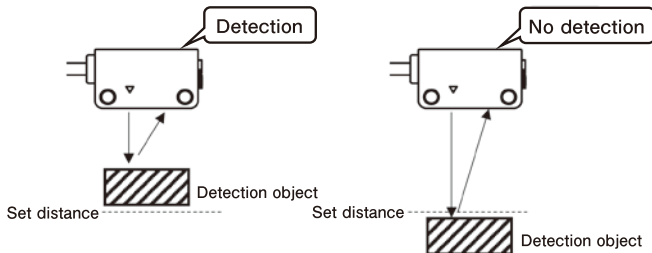


### (2) BGS/FGS



### 〈BGS (Background Suppression)〉

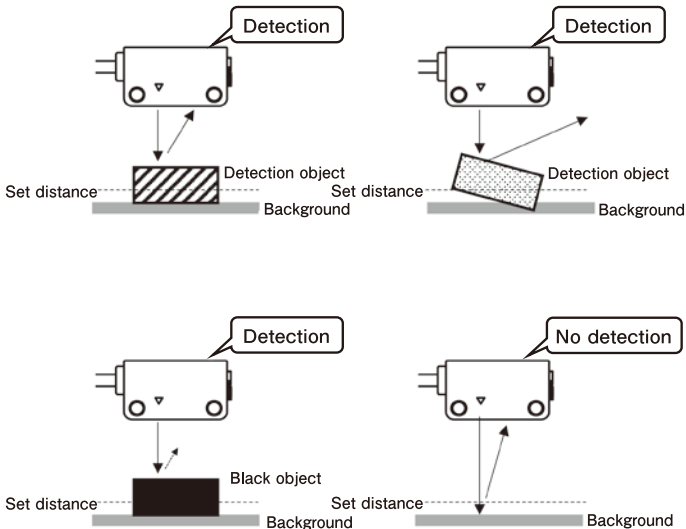
BGS suppresses the effects from the background of the detection area.



### 〈FGS (Foreground Suppression: Background Recognition)〉

FGS recognizes the background and detects objects that are closer than the background. It is effective when there's a steady and detectable background such as belt conveyor. FGS detects objects of various sizes including black objects.

※ Install the sensor so that the background is located within the range of setting distance.

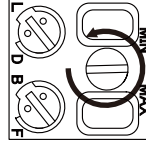


### (3) Distance Setting

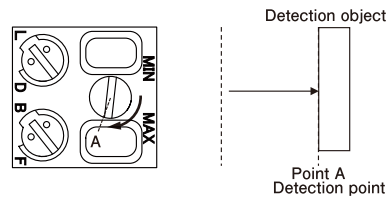
The distance settings for DLN-S10, DLN-S15, DLN-S20 and DLN-S30 are adjusted at factory to 100mm, 150mm, 200mm and 300mm respectively by using a white paper, at which the sensor has optimum sensitivity. The detection distance becomes longer than the specification when the distance setting volume is turned clockwise from the factory set position. The below shows the setting procedure for Light ON mode. The LED operation becomes reversed for Dark ON mode.

#### 〈For BGS mode〉

- Turn the distance setting volume counterclockwise until it clicks. (Five turns at the most.)

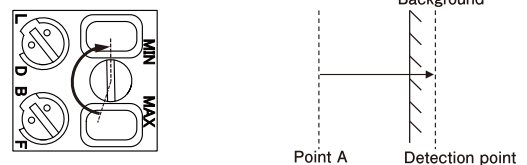


- Place a detecting object at the furthest point to be detected and turn the volume clockwise until the operation LED (orange) turns on (Point A). The detection distance may vary depending on the color, material or angle of the detection object.

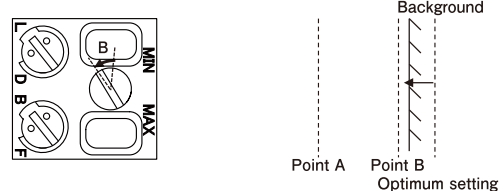


The setting is completed when there is no background within the detection area.

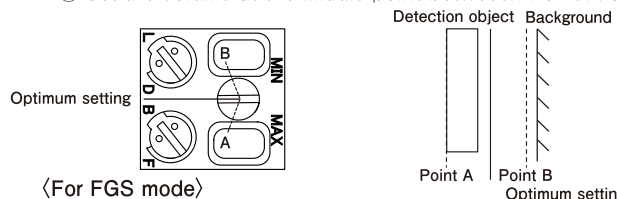
- When there is a background within the maximum detection range, remove the object and turn the volume clockwise and confirm the position where the sensor detects the background. (The operation LED turns on.)



- Turn back the volume (counterclockwise) to the point where the operation LED turns off. (Point B)

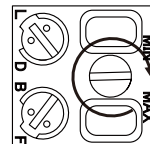


- Set the volume at the middle point between Point A and B.

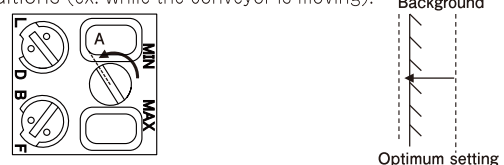


#### 〈For FGS mode〉

- Turn the distance setting volume clockwise until it clicks. (Five turns at the most.)

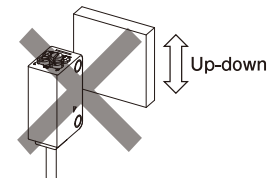
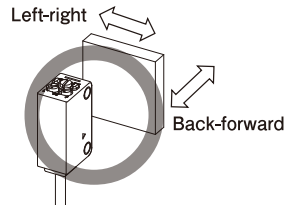


- Install the sensor at a detecting position so that the background is located within the range of detection distance. Confirm the operation LED turns ON, and then turn the distance setting volume counterclockwise until the operation LED turns off. Check the sensor doesn't detect the background under any conditions (ex. while the conveyor is moving).



## 8 DETECTING DIRECTION

Since the dual segment photo diode has directionality, the sensor may detect an object moving upward and downward even in the background outranged the setting distance.



## 9 SPECIFICATION

Model	NPN model	DLN-S10RMV	DLN-S15RMV	DLN-S20RMV	DLN-S30RMV	DLN-S10RMV-J	DLN-S15RMV-J	DLN-S20RMV-J	DLN-S30RMV-J
		DLN-S10RMV-Y5	DLN-S15RMV-Y5	DLN-S20RMV-Y5	DLN-S30RMV-Y5				
	PNP model	DLN-S10RMVP	DLN-S15RMVP	DLN-S20RMVP	DLN-S30RMVP	DLN-S10RMVP-J	DLN-S15RMVP-J	DLN-S20RMVP-J	DLN-S30RMVP-J
		DLN-S10RMVP-Y5	DLN-S15RMVP-Y5	DLN-S20RMVP-Y5	DLN-S30RMVP-Y5				
Detection method	BGS/FGS (Background recognition)								
Detecting distance (※1)	10 to 100mm	10 to 150mm	10 to 200mm	20 to 300mm	10 to 100mm	10 to 150mm	10 to 200mm	20 to 300mm	20 to 300mm
Setting distance (※2)	90 to 100mm	100 to 150mm	150 to 200mm	100 to 300mm	90 to 100mm	100 to 150mm	150 to 200mm	100 to 300mm	100 to 300mm
Set distance at factory	100mm	150mm	200mm	300mm	100mm	150mm	200mm	300mm	300mm
Power supply	12 to 24VDC, class 2 / Ripple 10% or less								
Current consumption	18mA or less								
Operation mode	Light ON / Dark ON selectable (by switch)								
Output mode	NPN / PNP open collector 2 outputs NPN open collector output / Load current 100mA (30VDC, class 2) or less / Residual voltage : 1V or less PNP open collector output / Load current 100mA (30VDC, class 2) or less / Residual voltage : 2V or less								
Light source (wavelength)	Four-element (AlGaInp) LED (660nm)								
Response time	0.5 ms or less								
Hysteresis	5% or less								
Indicator	Operation indicator: orange LED Stability indicator: green LED								
Volume	Distance setting volume (5-turn endless potentiometer)								
Switch	BGS / FGS selector, Light ON / Dark ON selector								
Circuit protection	Output short circuit / Reverse connection / Surge protection								
Anti interference	Automatic mutual interference prevention function (※3)								
Material	Case	PBT							
	Lens	Polycarbonate							
Connection	Attached cable (outer diameter $\phi$ 4.0mm) 0.2mm <sup>2</sup> × 4 cores 2m black 0.2mm <sup>2</sup> × 4 cores 5m black (***)-Y5)				M8 4 pin connector (Cable with connector is separately available.)				
Weight	60g (2m cable), 135g (5m cable)				12g				
Accessory	Instruction manual, screw driver (Mounting bracket: separately available)								

Note: The distance setting for DLN-S10, DLN-S15, DLN-S20 and DLN-S30 are adjusted at factory to 100mm, 150mm, 200mm and 300mm respectively by using a white paper, at which the sensor has optimum sensitivity.

※1 100mm × 100mm white drawing paper

※2 The detection distance becomes longer than the specification when the distance setting volume is turned clockwise from the factory set position.

※3 Check the operation when two sensors are installed adjacently. The mutual interference prevention function may not work properly depending on conditions of installation or detecting objects.

## ENVIRONMENTAL SPECIFICATION

Ambient light	5,000 lx or less
Ambient temperature	-25 to +55°C
Storage temperature	-40 to +70°C (non-freezing/non-condensing)
Ambient humidity	35 to 85%RH (non-condensing)
Protective structure	IP 67
Vibration	10 to 55Hz double amplitude/1.5mm 2 hours each in 3 directions
Shock	500 m/s <sup>2</sup> 3 times each in 3 directions
Dielectric withstanding	1,000 VAC 1 minute
Insulation resistance	500 VDC megger, 20M $\Omega$ or more

